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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,424	03/29/2006	Gareth Jones	F-8961	7623

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EXAMINER	
NGUYEN, PHILLIP	

ART UNIT	PAPER NUMBER
2828	

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03/31/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,424	JONES ET AL.	
	Examiner	Art Unit	
	PHILLIP NGUYEN	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15 and 17-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15 and 17-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/18/06& 1/17/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites in lines 1-2 "an electronic component" and in lines 5-6 "an electronic component" which is not clear whether if there is only electronic component or two of them. For the purpose of examination, it's Examiner's position to interpret the claim in light of the specification. Therefore only one electronic component is considered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 4, 9-10, 15, 17, 19-20, 23-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhou et al. (US 6994151).

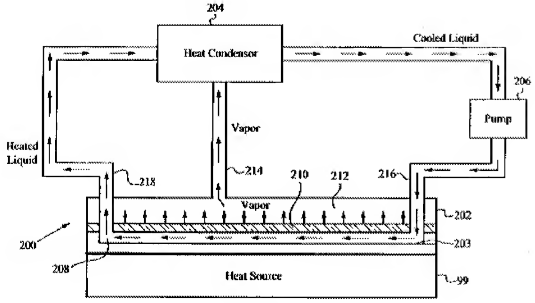

Fig. 4

With respect to claims 1, 19, 23-32, Zhou discloses the claimed invention throughout the patent. In Fig. 4 an apparatus 200 (and method thereof) for cooling an electronic component 99, the apparatus comprising a porous material 210, a source of coolant (inside the heat condenser 204 and pump 206), and a dispenser 216 arranged to deliver, in use, coolant, from the source of coolant into contact with the porous material, the apparatus being arranged such that in use the porous material is able to receive heat from an electronic component and such that in use such an electronic component is able to be cooled as a result of the vaporisation of coolant from the porous material.

With respect to claims 2 and 4, Zhou discloses a method step of delivering the coolant directly onto the exterior surface of the porous material by vaporizing the coolant from the heat

exchange 212 and delivering coolant into the interior of the porous material by pumping the coolant from the pipe.

With respect to claim 9, Zhou discloses the coolant including water, acetone, acetonitrile, methanol, alcohol, as well as mixtures thereof. These materials are believed to have a temperature below ambient temperature.

With respect to claim 10, Zhou discloses the porous material 112 and the coolant having properties such that the porous material is able to retain coolant (but not its vapor).

With respect to claims 15 and 17, Zhou discloses the electronic component (heat source) as a semiconductor device such as a laser diode which is capable of producing a wavelength in a range of 200 nm to 10000 nm (col. 6, lines 16-23).

With respect to claim 20, since the electronic component is mounted to the housing of the heat exchange 202, the heat exchange interface 203 is considered as a heat spreader for conducting heat from the electronic component to the porous material 210.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 5-6, 7-9, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. (US 6994151) in view of Miller et al. (US 6354370). Zhou discloses the claimed invention except for the delivery of the coolant being controlled by a control unit in dependence on a temperature dependent signal received by the control unit. Miller discloses in Fig. 1 a cooling apparatus and method which includes a control unit 7 in dependence on a temperature dependent signal (from the temperature sensor 10) received by the control unit. It would have been obvious to one skill in the art at the time the invention was made to provide a control unit as taught by Miller to Zhou in order to control the temperature of the electronic component to a desired range or low power consumption (col. 3, lines 35-41).

4. Claims 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. (US 6994151) in view of Brace et al. (US 20030075120). Zhou discloses the claimed invention except for the coolant being delivered in pulses. Brace discloses a cooling system that utilizes pulsing for delivering coolant [0059]. It would have been obvious to one skill in the art at the time the invention was made to provide coolant delivered in pulses to generate increased turbulence and increased disruption and penetration as compared to steady flow of coolant [0030].

5. Claims 1, 3, 7-9, 11-13, 18-19, 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al. (US 20040019452) in view of Saito et al. (US 20020037412).

With respect to claims 1, 19, 23-32, Song discloses the claimed invention throughout the patent. In Fig. 3 an apparatus 100 (and method thereof) for cooling an electronic component S

(semiconductor device, paragraph 0031), the apparatus comprising a source of coolant 110 and a dispenser 170 arranged to deliver, in use, coolant, from the source of coolant into contact with the electronic component. However, Song does not disclose a porous material so that the coolant is delivered to it to cool the electronic component. Saito discloses in Fig. 18-20 a heat sink using porous material for electronic components such as semiconductor lasers. It would have been obvious to one skill in the art at the time the invention was made to provide the porous material as taught by Saito to Song in order to higher heat dissipation with low cost (paragraph 0010).

With respect to claim 3, Song discloses spraying the coolant (see 170A).

With respect to claims 7-9, Song discloses the coolant is a refrigerant which inherently includes the properties such as a gas at ambient temperature and pressure, delivered at a temperature below ambient temperature and must be stored under pressure.

With respect to claim 11, although Saito does not explicitly teach the porous material having a porosity of between 4 to 40 pores per centimeter, Saito does include different range of porosity to obtain the most sufficient heat transfer. Therefore, obvious to one skill in the art at the time the invention was made to provide the claimed porosity in order to obtain the desired value of thermal conductivity and ventilation.

With respect to claim 13, Saito discloses in the entire reference the porous material having thermal conductivity at least 100 Wm-1K-1.

With respect to claim 18, it would have been obvious to one skill that the refrigerant could easily cool at least a portion of the electronic component to below ambient temperature.

6. Claims 1, 12, 19, 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al. (US 20040019452) in view of Nemes (US 5225964). Song discloses the claimed invention throughout the patent. In Fig. 3 an apparatus 100 (and method thereof) for cooling an electronic component S (semiconductor device, paragraph 0031), the apparatus comprising a source of coolant 110 and a dispenser 170 arranged to deliver, in use, coolant, from the source of coolant into contact with the electronic component. However, Song does not disclose a porous material so that the coolant is delivered to it to cool the electronic component. Nemes discloses in Fig. 2 a heat sink 41 using porous material, particularly metal foam 43. It would have been obvious to one skill in the art at the time the invention was made to provide the porous material as taught by Nemes to Song in order to lightweight heat sink with high thermal efficiency (see field of the invention).

Communication Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Phillip Nguyen/

AU 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828